

TABLE II.—COMPARISON OF BLOOD-COUNTS OF MOTHER, CHILD, AND PLACENTA; AVERAGE OF THREE COUNTS.

Date.	Subject.	Red cells.	W. : R	Remarks.
1886. Oct. 29	Mother . . .	990,000	1 : 4	Two hours after delivery.
" Oct. 29	Child . . .	5,210,000	1 : 175	Two hours after birth.
" Oct. 29	Umb. vein (trunk)	4,610,000	1 : 173	Eighteen hours after expulsion of the placenta.
" Oct. 29	" " (branch)	4,600,000	1 : 128	
" Oct. 29	Umbilical artery .	5,410,000	1 : 270	
" Oct. 29	Placental sinuses .	950,000	1 : 3.6	
1886. Nov. 1	Mother . . .	1,100,000	1 : 20	The morning after delivery. The morning after birth. Twelve hours after expulsion of placenta. Five days post partum.
" Nov. 1	Child . . .	5,009,000	1 : 150	
1888. Feb. 15	Mother . . .	2,100,000	1 : 39	
" Feb. 15	Child . . .	6,600,000	1 : 330	
" Feb. 15	Umbilical vein .	5,150,000	1 : 300	Twelve hours after expulsion of placenta.
" Feb. 15	" artery .	6,340,000	1 : 350	
" Feb. 19	Mother . . .	1,970,000	1 : 30	Five days post partum.
" Feb. 19	Child . . .	6,520,000	1 : 325	

TABLE III.—BLOOD-COUNTS OF CHILDREN; AVERAGE OF THREE COUNTS.

Date.	Name.	Red cells.	W. : R.	Remarks
1887. July 13	Walter, æt. 15	3,355,000	1 : 200	In Montreal General Hospital.
" Aug. 18	" æt. 15	3,240,000	1 : 200	
1888. Feb. 19	" æt. 16	4,620,000	1 : 230	
1890. April 6	" æt. 18	2,500,000	1 : 155	
" April 6	" æt. 18	3,480,000	1 : 117	
1887. July 13	Arthur, æt. 14	4,725,000	1 : 350	Was in Montreal General Hospital, from October 5 to December 12, 1885, with leukæmia; spleen enlarged. In failing health.
1887. July 13	Lydia, æt. 11	4,795,000	1 : 350	
1890. July 16	" æt. 14	5,240,000	1 : 300	
1885. Oct. 12	Louisa, æt. 6	1,912,000	1 : 15	
" Dec. 2	" æt. 6	3,576,000	1 : 16	
1887. July 13	" æt. 8	4,220,000	1 : 300	In failing health.
" Aug. 18	" æt. 8	3,183,000	1 : 240	
1890. July 15	" æt. 10	3,930,000	1 : 150	
1887. July 13	Charles, æt. 6	4,525,000	1 : 350	Spleen enlarged, red corpuscles diminished, white increased; blood-count lost. Died at six months.
1890. July 16	" æt. 9	5,050,000	1 : 250	
1885. Sept. 15	Fred., æt. 3 mo.			

AN ANALYSIS OF THE MOTOR SYMPTOMS AND CONDITIONS
OF THE OCULAR APPARATUS, AS OBSERVED IN IMBECILITY,
EPILEPSY, AND THE SECOND STAGE OF
GENERAL PARALYSIS OF THE INSANE.

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THE present paper combines a series of observations and conclusions, the result of four years' work in this class of cases at the State Hospital for the Insane at Norristown, Pa. The grouping of the motor innervations and actions as seen in epileptic dementia, as shown in imbecility in the adult male, and as found in the second stage of so-called general paresis, into a separate and distinct analysis from that of the sensory changes of the same apparatus, has served to form a portion of the Tenth Annual Report of the Institution. It is here presented as a series of conditions and actions which are so frequently observed amongst such individuals as seemingly to admit of sufficiently broad generalizations to allow proper, though of course tentative, conclusions.

Certain governing rules in the selection of the cases, which have been established from the first observation, and which are believed to be of sufficient importance to demand recapitulation are here given:¹

1. A special variety of symptomatic disease was taken in preference to any mental condition, because similar mental states in the many and bizarre forms of nerve lesions, masking and hiding the true significance of the objective symptoms peculiar to any one disease to such an extent as to render differentiation impossible, are very frequent in mental disorders.

2. A definite variety of disease was chosen, so as to avoid obtaining a mere percentage of the ophthalmic signs of the total number of cases occurring in one asylum—an answer which through constant changes in the number of the resident population or temporary peculiarities in the character of mentality, is liable to alter at any time, and thus make such an analysis give results and conclusions which would be totally diverse from those that might be obtained by another observer placed in a different situation.

3. A large percentage of similar cases was taken. This was done so that the different mental states which are seen during a definite situation in the course of any one disease might be united in a theoretical example of the physical and physiological conditions of the disease at that stage.

¹ See Proceedings of the Philadelphia Neurological Society for December 27, 1886, in the Philadelphia Medical Times, February 5, 1887, and elsewhere.

4. Males were used; this is important, for, by the exclusion of the female subject, any errors that might arise from additional ocular changes dependent upon diseases which are peculiar to the sex would thus be avoided.

At first, among the epileptics, no differential diagnoses were attempted as to the causation of the convulsions, this being done so as to embrace the entire grouping of such cases into a common lot of subjects, in order to have the greatest variations of supposable differences present at one and the same time, and thus to give greater latitude to error. Later, however, as the subject became more familiar and finer differentiations became more visible, attempts were made to isolate the cases into specialized groupings. Although most of the peculiarities of the pupil, independent of local adhesions or individual differences in the behavior of the irides which could be accounted for by refractive error, seemed to be in direct correspondence with the local conditions of the optic nerves and retinae, yet in a few instances there were some very curious errors of extra-ocular and intra-ocular muscle-action, which no doubt were the visible expressions (just as the rest) of some peculiar though definite phases in the natural history of the general disease.

During the examination of the imbeciles the following precautions were observed:¹

"First. Care was taken to exclude all but the proper class of subjects, no one being admitted who could not be properly designated as one with decided loss of mental power of a minor degree than idiocy, from malformation or disease of the nervous system, either supervening in infancy or occurring before birth. This was done so as to avoid any error that might arise from the presence of ocular symptoms which might be dependent upon other malformation or disease, and to exclude any question as to the use of eyes for prolonged near-work during the early years of life.

"Second. Subjects chosen whose eyes were free from extraneous disease or inflammation. Sore eyes of inflammatory and traumatic types were avoided, so as to obtain as nearly as possible representative peripheral (end) organs of comparatively healthy functional activity.

"Third. Young adults were used. This was done for two reasons: first, to have the eye at its full maturity, and thus not to allow any question of further development to enter into the argument; and second, to have the tissues of the eye at their best before any of the processes of natural decay should have manifestly asserted themselves.

"Fourth. Males have been taken. These were chosen so as to avoid any errors that might arise from additional ocular changes which might be associated with diseases peculiar to the female sex.

¹ See Transactions of the American Ophthalmological Society, 1887.

"Fifth. Every subject was submitted to the same routine examination, thus preventing any seemingly gross changes to appear that might arise from differences in methods of study.

"The reasons for such rules must be obvious, as by their observance all faults in working and want of precision in method are reduced to a minimum, and the conclusions, which are the very import of the work, are thus rendered more valuable and less liable to grave and deceptive error."

In the third series of cases great care was also taken that each subject was seemingly free from any extraneous general disease or local disorder, and that competent and authoritative medical opinion had been given as to the type of the general complaint; besides, the entire study in this direction has been limited to the male sex, so as to escape any conflicting complicating changes that might appear in connection with the many diseases peculiar to the female sex.

OBSERVATIONS: INTRA-OCULAR MUSCLES.

Epilepsy.

First. Iris muscle innervation in most instances seemingly normal in reference to both the age of the patient and the refractive condition.

Second. Iris muscle action, as a rule, apparently unimpaired both in separated and combined motion.

Third. Ciliary muscle innervation, as a rule, most probably normal.

Fourth. Ciliary muscle action apparently generally unaffected; being in direct proportion to what should be expected for age and refractive change.

Imbecility.

Fifth. Iris muscle innervation generally normal for age and amount and character of error of refraction.

Sixth. Iris muscle action sometimes sluggish to efforts for convergence and accommodation, though rather more prompt to light-stimulus; the degree of these acts being in due proportion to the grade of imbecility.

Seventh. Ciliary muscle innervation apparently normal.

Eighth. Ciliary muscle action impossible to obtain accurately subjectively, though objectively there appeared to be a deficient response in a few cases.

Second Stage of General Paresis.

Ninth. Iris muscle innervation frequent, as shown by more or less irregularities in pupil-form; this being notably seen not only in different subjects, but of frequent occurrence at various times in the same patient.

Tenth. Iris muscle action generally lessened to light-stimulus, frequently unequal to light-stimulus and accommodation, and in several instances very feebly responsive to efforts for accommodation and convergence alone; these changes often manifesting themselves in the two irides of the same subject.

Eleventh. Ciliary muscle innervation lessened, although no reliable subjective and objective method could be used to scientific advantage and accuracy.

Twelfth. Ciliary muscle action probably pathologically decreased independent of senile change and character of error of refraction; this most absolutely certain, and sometimes seemingly rendered apparent by the use of the retinoscope.

EXTRA-OCULAR MUSCLES.

Epilepsy.

Thirteenth. Extra-ocular muscle innervation seemingly proper in the vast majority of cases, a few cases showing some peculiarities in motor station: the quite large number of insufficiencies of the interni that could be properly studied being in every instance associated with an existing compound hypermetropic astigmatism.

Fourteenth. Extra-ocular muscle action apparently intact in all directions, although in the greater number of cases of insufficiency that could be depended upon, there was a preponderant work given to the interni for proper binocular adjustment; this latter condition in every case, however, having both farsightedness and astigmatism associated with it.

Imbecility.

Fifteenth. Extra-ocular muscle innervation, as a rule, apparently normal; fully one-half of the cases examined preserving proper muscle balance.

Sixteenth. Extra-ocular motion intact in all directions; a very slight insufficiency of the internal recti being found in about fifty per cent. of cases.

Second Stage of General Paresis.

Seventeenth. Extra-ocular muscle innervation the rule, as shown by insufficiencies of all the straight muscles, though more particularly when the interni were associated in action with efforts for convergence.

Eighteenth. Extra-ocular muscle action weakened, as seen by peculiar nystagmic motions which are made visible at the moment of the utmost contraction of the experimented muscle, and the preponderance

of insufficiencies of the recti muscles, especially the interni, over their related refractive conditions.

CONCLUSIONS.

First. In idiopathic epilepsy of the male adult, even where the stage of dementia has been reached, both the intra-ocular and the extra-ocular motor-groupings seemingly, as a rule, remain unimpaired both as to innervation and to active impulse, although in some instances curious enervations and limitations of action seem to exist.

Second. In the lower grades of imbecility, as seen in the male adult, which have resulted from malformation or disease of a minor degree than that producing so-called idiocy, that have supervened in infancy or occurred before birth, both the intra-ocular and the extra-ocular muscle-groupings, as a rule, remain unaffected both as to innervation and as to proper action; in fact, they seem ordinarily to retain their original condition without any pronounced indications of wear and tear; a condition that most probably evidences very little abuse of a delicately poised muscular apparatus.

Third. In the second stage of paresis, as seen in the male, both the intra-ocular and the extra-ocular motor-groupings are in all instances more or less paretic, as evidenced by inequalities and irregularities of pupillary areas, with peculiarities in iritic movement and loss in ciliary tone and power, as well as by extra-ocular insufficiencies and ataxic nystagmic motions—all indicative of imperfect muscle-innervation and inadequate muscle-action.